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The Future of Our Breed

The fight to keep it alive

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INTRODUCTION

What do we want to transmit to future generations?

Not to criticize what was done before us. Not to oppose breeders, judges or owners.

INTRODUCTION

The breeder of tomorrow

01

Guardian of the standard

02

Guarantor of temperament and functionality

03

Actor for health and genetic diversity

One important change: from selection based mainly on what we can see, to selection that combines **what we see** with **what science can now measure**.

1 · A QUESTION I HAVE ASKED FOR MORE THAN 20 YEARS

Fewer puppies, fewer breeding dogs

In many countries births are decreasing, for no single reason:

- The difficulties of breeding
- Reproductive problems
- Economic and regulatory constraints
- Health problems
- The ageing of some breeding kennels
- The discouragement of some breeders
- A society that is changing

Fewer births can mean fewer breeding dogs.

If fewer dogs are really used for breeding, the genetic population can become even more concentrated.

THE QUESTION AT THE HEART OF THIS TALK

Many Newfoundlands… or a lot of genetic diversity?

Many different dogs… or many dogs carrying a very large part of the same ancestors?

2 · HOW DID WE BUILD OUR BREED?

We selected what we could observe

Type | Morphology | Head | Bone | Proportions | Gait and movement | Coat | Colour | Temperament | Working ability | Functionality | Health we could observe | Pedigree

Our eyes, our experience and our pedigrees: it was not a bad system. It built the Newfoundland we know today.

3 · THE PROBLEM: WE SELECT WHAT WE CAN SEE

We built our breeds with our eyes

Phenotype

Shows what the dog is, but not everything the dog carries.

Pedigree

Tells part of the dog's history, not necessarily its complete genetic reality.

Genome

Two dogs can look very different and still be genetically close.

Not “before we did everything wrong”. We combine **our experience and our eyes** with **genetic information**.

4 · AND WHAT ABOUT THE CONSEQUENCES FOR HEALTH?

What our selection history shows us

- Hip dysplasia
- Elbow dysplasia
- Osteoarticular abnormalities
- Developmental abnormalities
- Cardiac problems
- Stenoses
- Cardiomyopathies
- Limb abnormalities
- Reproductive problems
- And other conditions whose causes are still poorly understood

Not all of these diseases are caused by inbreeding.

That would be scientifically wrong. Some are multifactorial: several genes and the environment.

When…

- the same breeding dogs are used again and again,
- the same ancestors appear everywhere,
- certain bloodlines become dominant,
- the breeding population actually used becomes smaller…

…we have to ask questions.

Could our selection method sometimes favour, without our knowing it, the concentration of certain genetic risks?

5 · THE SCIENCE NOW GIVES US NEW TOOLS

Think beyond the individual dog

NOT ONLY

“Which is the best dog?”

ALSO

“Which is the best mating for the population?”

- Its level of inbreeding
- Its place in the population
- Possible matings
- Consequences for future generations

Work of David Lévy on the genetic management of the Saarloos Wolfdog. We should not oppose quality and diversity: we look for the best balance.

First, establish the diagnosis

“What do we need to know about our population?”

- Which bloodlines are overrepresented, and which are becoming rare?
- Do we know the real relatedness between our families and bloodlines?
- Do we know the effective population size?
- What proportion of births depends on a small number of popular sires?
- What proportion of dogs born actually become breeding dogs?
- How many males and females actually reproduce?

UC Davis

Its Newfoundland programme uses STR markers and DLA regions. Useful on certain aspects of genetic diversity.

But its coverage is limited: by itself it is not a complete analysis of the breed's genome.

6 · CONCRETE DATA FOR OUR OWN BREED

We already have some data on inbreeding

23.27%

Adjusted inbreeding estimate

Bannasch et al. (2021) · 137 dogs

30.79%

Median coefficient from SNP data

Second sample · 15 dogs

Different methods, limited samples: not representative of the entire breed. But they are concerning signals that deserve further investigation.

7 · NOTIONS TO LEARN

Pedigree inbreeding is not the whole story

What it gives us

An estimate based on the ancestors we know. The more generations we know, the more informative it becomes.

What it cannot show

A low coefficient from only a few generations does not prove low cumulative inbreeding. Two dogs can share important identical parts of their genome.

- Heterozygosity
- Homozygosity
- Runs of Homozygosity (ROH)
- Genetic relatedness

One gene, two copies

A / A

Homozygous

A / B

Heterozygous

Some homozygosity is completely normal.

The problem is unnecessarily increasing it, and progressively losing heterozygosity and diversity.

ROH, Runs of Homozygosity: long parts of the genome where the two copies of DNA are identical. They inform us about the history of a population.

Homozygosity and recessive disease

≈2,500
dogs studied

11
breeds

678
homozygous recessive deleterious genotypes

≈90%
overlapped with ROH regions

An ROH is not a disease. But increased homozygosity can make it more likely that two identical copies of a harmful recessive variant come together.

Marsden et al. (2019)

OUR GOAL

Not to eliminate all homozygosity. That would be impossible and absurd.

To avoid unnecessarily increasing inbreeding and homozygosity, while preserving as much heterozygosity and diversity of our population as possible.

9 · THIS DOES NOT REPLACE THE BREEDER

The genome does not replace the breeder. It gives the breeder more information.

No computer saying “This mating is allowed” or “This mating is forbidden”.

Before a mating we will also ask: how related are these two dogs, how much diversity can they bring together, and what place could their offspring have in the population?

The breeder knows

Temperament

Morphology

Strengths and weaknesses

Families

Functionality

Reproduction and longevity

And much that statistics cannot fully capture

11 · WHAT I PROPOSE FOR THE NEWFOUNDLAND

Clubs as an observatory of the population

01
Collect the data

02
Harmonize it

03
Follow its evolution over time

04
Make it understandable and useful to breeders

A real international study of genetic diversity: different countries, bloodlines and generations; males and females; highly used and less-used breeding dogs.

Not only American dogs. Not only French dogs. Not only champions.

12 · I AM CALLING ON BREEDERS AND OWNERS

Genetics must not become a ranking of dogs

One dog

gives us information.

One hundred

begin to sketch a population.

Several hundred

begin to show its real genetic structure.

Not a genetic medal. Not “My dog is more diverse than yours.” Owners can take part too: an old dog, a dog from another country, from an old family, from a rarely represented bloodline.

For this, we need everybody.

Measure. Understand. Educate. Select.

Measure

We cannot manage what we do not know.

Understand

A genetic result is not a verdict. We need to understand what it means.

Educate

Teach breeders and owners how to use these tools, so genetics is not another source of fear or confusion.

Select

Only then do we use all this information in our breeding decisions.

It is about preserving the breed

Not a war between:

- Type and health
- Beauty and genetics
- Work and diversity
- Breeders and animal welfare advocates

We must show that breeders have heard the criticism, that we have learned, that we are capable of changing.

We must not be in denial. We must be ahead of the problem.

17 · AND WHAT IF WE DO NOTHING?

This may be the most difficult question

The population keeps decreasing

Fewer breeding dogs are really used

A few bloodlines become extremely well represented

The same combinations are reproduced

→

We progressively lose genetic diversity

→

Outcrossing with another breed?

Something that some other breeds have already had to consider.

17 · AND WHAT IF WE DO NOTHING?

With what?

With which breed? Which population? Which characteristics? Which morphology? Which temperament? Which functionality?

With what, if we want to remain a Newfoundland?

I would infinitely rather work before we reach that point.

We are its custodians.

We received the Newfoundland from the breeders who came before us: their dogs, their bloodlines, their knowledge, their work.

Not a photograph of today, but a population that is

- Healthy
- Functional
- Balanced
- True to the standard
- **Genetically diverse enough**
- Able to keep evolving without losing its identity

CONCLUSION · THE FIGHT TO KEEP IT ALIVE

So why choose? Let us use everything

The pedigree | The phenotype | Health | **The genotype** | The breeder's knowledge | Statistical tools | Simulation tools

And above all, let us work together, internationally.

The Newfoundland does not stop at a national border. Neither does its genetic diversity.

CONCLUSION

We built our breeds with our eyes. Today, science allows us to look into their genome as well.

Our objective is not simply to produce the best dog. It is to preserve a population capable of producing good dogs tomorrow.

Our fight is to give the Newfoundland a future.

Thank you.

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